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SOME ORIGINAL OBSERVATIONS ON THE HABITS OF *DACTYLOPSILA TRIVIRGATA* GRAY

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The striped phalangers of the genus *Dactylopsila* are remarkable for an elongated finger on the fore paw and rodent-like teeth. One species, *D. palpator*, was used as the type of a new genus, *Dactylonax*, by Thomas[1] because of the extremely long and attenuated finger.

It has been said that the rodent-like teeth are used for gnawing out wood-boring grubs and the elongated finger is used for extracting the grubs from crevices.[2, 3, 4] Though the present species is not the most specialized of its group, the fourth finger of the fore paw being only somewhat elongated and not much more slender than the others, my observations substantiate the above remarks on the habits of this group, which, apparently, have hitherto rested on deduction rather than observation.

Troughton[5] has given a summary of the little that is known about the habits of the members of this genus and most of the following observations are new. These were made while I was with Mr. Richard Archbold's 1936 New Guinea Expedition. At Tarara, Wassi Kussa River, south New Guinea, in January, 1937, the natives brought me a live specimen of *Dactylopsila trivirgata* (hereafter referred to as Dax) which I kept till March 4, 1937. On that date I left New Guinea and gave Dax to Mr. Brass, botanist of the party, who presented it to the Brisbane Museum. I kept Dax in a cage made of wire bird-drying trays, in which I put a section of hollow log for sleeping quarters. During that time I also had several live *Petaurus* in another cage. I have included a few comparative notes on their habits.

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[1] 1910, Ann. Mag. Nat. Hist., (8) VI, p. 610.
[2] Flower, W. H., and Lydekker, R., 1891, 'Introduction to the Study of Mammals,' London, p. 153.
[3] Thomas, O., 1910, Ann. Mag. Nat. Hist., (8) VI, p. 610.
[4] LeSouef, A. S., and Burrell, H., 1926, 'Wild Animals of Australasia,' London, p. 250.
[5] 1930, Austr. Zool., VI, pp. 169, 170.

GENERAL

Dax was an extremely quiet, strictly nocturnal captive. For the first few days it slept during daylight hours crouched on the floor of its cage. It appeared quite indifferent to its surroundings, but was very sensitive to a jar or tapping on its cage, which caused it to shrink. Later, accustomed to its quarters, it slept curled up on the floor of the cage, and when the section of hollow log was introduced Dax at once slept in that. Dax had not the quick movements and bright-eyed peering attention of *Petaurus*. After dark Dax became active, exploring its cage and, in apparent bursts of energy or rage, moving sticks and its drinking dish, gnawing at the wooden end of its cage and breaking out pieces of its sleeping log with its teeth. In the rays of an electric torch, its eyes gleamed a pale orange-yellow.

The ears were very mobile, usually held about horizontal and occasionally erected. When Dax was resting or sleeping, the ears were frequently closed down against the head, covering the orifices, possibly a modification to protect the orifices from débris in the hollows of trees in which, the natives told me, this animal normally passes the day.

Dax frequently licked both the palms and the backs of its paws. In licking the hind paws it sometimes sat on its rump, supported itself on one fore paw and held up a hind paw in the other fore paw. Only rarely did it groom the rest of the body. Once I saw Dax grooming the fur of its rump with the tongue and teeth. On January 28 I saw it grooming the fur of its body with its hind paws. Partly curled up, Dax combed the fur of one side of its body, up to the middle of its back, top of the head and behind the ear with one hind foot. It really combed the fur with its claws and stopped every now and then to lick them. Once it even reached under the body to comb the opposite thigh. Occasionally the fore paws were used to wipe the sides of the muzzle.

When the animal yawned, as it did occasionally, the tongue protruded to an amazing length. When excited or curious, the nostrils were continually twitched.

CLIMBING AND AGILITY

Dax climbed well on the various branches placed in its cage, descending vertical branches head first (as did *Petaurus*). The big toe of the hind foot is opposable and is opposed in climbing; the thumb is not opposable (the same is true of the *Petaurus*).

Although the tail is bare on the under surface near the tip, I never saw the tail used as a prehensile organ and doubt if it is of much use as

such. Once, however, when Dax was about to tip head first off a small horizontal branch, the tail was curved upward, catching on a branch above, and helped Dax to maintain its balance. *Phalanger*, which uses the tail in a prehensile manner, frequently has it curled like a watch spring when moving slowly about; *Petaurus*, with a non-prehensile tail, sometimes does the same. Dax I did not see do this although the tail was curled up when the animal slept.

It was amazing how supple Dax was. It turned in a hollow log little larger than the diameter of its body. While climbing upside down on the wire mesh of the top of its cage, I saw Dax several times hold on by its hind legs alone, turn its body back through the triangle formed by the hind legs, twisting them quite about before letting go with one, then the other, to drop to the floor of the cage headed in the opposite direction from which it started. One evening Dax came down its vertical hollow log until it could reach the dish of milk on the floor. In this position it drank its fill. Then it picked up a grub from the floor of its cage, held it in its fore paws and devoured it piecemeal while it hung by its hind legs only, its head an inch or so from the floor. *Petaurus* I have seen act in a precisely similar manner. Apparently these animals are so much at home in any position that they do not bother to move to an upright one.

DEFENSE

The natives who brought me Dax told me that it had badly bitten one of them during its capture. When first caged I held a banana toward it. Dax sat up on its haunches, widely spread its forelegs with the wrists turned sharply back, displaying the long fingers to the best advantage and uttering a series of short, grunting squeaks. It looked formidable but did not bite as I touched its nose with the banana. I saw this defense attitude very seldom. Later, when some object was held before its nose, it simply made a single bite at it and then turned away its head.

Though *Petaurus* had a similar defense attitude which was commonly seen, its further actions were different. It watched the intruding object intently, sprang forward a few inches to administer a quick bite, then sprang back again, often giving its squealing chatter.

DRINKING

From the first Dax drank readily and preferred milk to water. It very soon drank from a container held in my hand. It lapped up the fluid with its tongue, making a low sound. Sometimes the nose was no closer than half an inch or more to the surface of the milk, and I found

that Dax could drink quite well from a cup held outside its cage by lapping with its long tongue through the half-inch wire mesh.

The Wassi Kussa River during the dry season is salt as far as Tarara and fresh water is very scarce. If this species needs to drink water regularly, this may be a factor in limiting its distribution in this part of New Guinea.

FOOD

Dax refused banana, mango, bread and butter, jam, peanut butter and raw meat. It ate locusts to a limited extent but sometimes ignored them, however; it ate termites and various soft-bodied wood-boring beetle larvae readily.

This differs from the various records for other members of the genus which are said to eat fruit, leaves and honey as well as insects, while captive specimens in Toronga Park were said to have lived well on a varied diet of condensed milk, biscuits, fruit and lettuce.[1]

During the first five weeks I had Dax, I fed it on wood-boring grubs and gave it milk to drink. During the last three weeks it received milk alone (Nestle's Sweetened Condensed) and appeared to thrive. Dax was always slow to find food unless held directly under its nose, but quickly learned to associate forceps with food and to look for food in the same place.

USE OF TEETH

The rodent-like teeth of Dax were apparently not so much cutting as prying and tearing instruments, adapted more to tearing open dead, rotten logs or removing bark, than cutting solid sticks. The lower incisors were thrust into the wood, and using the upper incisors as a fulcrum, the head and body acted as a lever to tear out the piece. Thomas[2] suspected some such use from an examination of the teeth of a specimen of *Dactylonax*. When first placed in a kerosene case, Dax started tearing at a crack and would have effected its escape in a very short time. Later it prized splinters and bark off sticks placed in its cage. When a splinter of wood came partly free, it was torn off with a sideways swing of the head. In feeding, the teeth were used to remove the layer of timber protecting wood-boring grubs.

FEEDING

The following are examples of its method of feeding. They were observed during the night with the aid of a weakly burning flash-light. This presented some difficulties and demanded some patience as, when

[1] Troughton, L., 1930, Austr. Zool., VI, pp. 169, 170.
[2] 1910, Ann. Mag. Nat. Hist., (8) VI, p. 610.

the cage was illuminated, Dax frequently became immobile and remained so for some time.

1.—Termites: When I first had Dax and it was tearing splinters off a stick in its cage, I dropped termites one by one just in front of its nose. Dax ate them readily. After eating one it returned to tearing off splinters, noisily licking the surface of the stick, tearing off more splinters and occasionally tapping the stick with its front paws.

I had little success with getting Dax to extract termites from termite-riddled sticks placed in its cage, though once I saw it tear off a piece of bark and pick up a termite from underneath it. It frequently ate stray termites.

The long, extensible tongue and strong teeth all appeared well adapted for termite feeding. The light tapping of the fore paws may also be for startling termites into activity and so locating them or it may be for locating the tunnels of large wood-boring grubs. This tapping, often given when exploring a wood surface, is a quick, sharp tapping of the claws on the wood, producing almost a rustling sound.

2.—Locust: While Dax was very hungry I offered it a locust held in the forceps. Dax at once took it, bit it several times and then dropped it. A few moments later it picked up the locust, held it in its fore paws, pulled off the abdomen and ate it. Later, however, it ignored locusts, even when one lit on its face while Dax was eating a beetle larva.

3.—Small wood-boring beetle larvae: These, a half inch or so long, were eaten eagerly. They were either held up in the paws or held against a stick or the floor while pieces were bitten off and eaten.

4.—Large wood-boring beetle larvae: Some of these were half an inch in diameter and four and a half inches long. They were eagerly eaten though their tough skin caused some difficulty.

Holding the larva in the fore paws, a hole was made, usually in the posterior extremity, with the teeth. Then the contents were extracted by inserting the tongue and rapidly licking, every now and then jabbing into the body with the lower incisors. At times I could see the tongue working inside the partly emptied skin. Dax frequently rapidly licked the outside of the grub. As the skin was emptied it would occasionally be worked into the mouth and then, with the paws, pulled out of the side of the mouth over the molars, apparently to force out the contents of the skin. Working up near the head, Dax sometimes bit the head and frequently extracted the grub's body-contents through additional lateral openings torn in the skin. When Dax was finished there was left the head and part of the thorax attached to an empty tooth-scarred skin.

5.—Small beetle larvae placed in crevices in wood: After feeding Dax a few small grubs from the forceps, I put several into the crevices of a jagged piece of timber in its cage. Most of them were extracted at once by the long tongue, protruded to the fullest extent, licking them from the crevice. A few times the grubs stuck too solidly for that. At first Dax attempted to break open the crevice with its teeth but the wood was too hard. Then the elongated finger was successfully inserted to move them loose.

6.—Large wood-boring beetle larva enclosed in fragile wood: A larva three and one-half inches long was enclosed in thin, fragile splints of wood from the termite-infested floor. After much trouble Dax located the larva, broke a small opening in the wood cover with its incisors and extracted most of the contents of the grub with the tongue and lower incisors, sometimes holding the portion of the partly emptied skin pulled from the hole in one fore paw. It did not attempt to remove the entire grub from the cavity.

7.—Large wood-boring beetle larvae enclosed in solid wood: The "solid blocks" in which these grubs were incased were made by nailing together two pieces of a kerosene case. The cavities for the grubs were made by carving grooves on the sides of the pieces of wood before nailing them together.

One larva (four inches long) was placed in about one-half inch from the entrance of a hole of about its own diameter, opening at the end. The other was protected by about one-quarter inch of wood along the thinnest side and in this I cut a triangular opening about one-quarter inch across.

I watched Dax extract the first larva by fishing into the hole with the long fourth finger. When the end of the grub was brought up it was seized in the mouth, and teeth and tongue proceeded to empty the skin. No attempt was made to extract the whole grub. The part pulled out was taken from the claw by the mouth, and then apparently there was an attempt to work the grub's contents gradually into the mouth as the eating proceeded. Occasionally there was a break in the material being worked into the mouth. The elongated finger was then used like a pole with a hook at the end, tried at various angles, to pull out another strand on which to start. The next morning I found that only the posterior third of the grub had been eaten, the rest evidently having been beyond reach.

I did not see Dax at work on the second grub but on examining the wood in the morning I found only the head and part of the thorax in the

cavity. Most of the grub, including the skin, had been removed without enlarging the small opening provided. Evidently the elongated finger had been used here too.

SUMMARY

Observations were made on a captive *Dactylopsila trivirgata*. It was a quiet, rather stupid creature, nocturnal in habits. It was an agile climber but though the tail is apparently adapted for prehensility, it was not seen to be so used. The big toe is opposable, the thumb not so, but food is held in the fore paws. *Dactylopsila* has a specialized defense attitude. It drank readily and preferred milk to water. If drinking is necessary to this animal that may limit its distribution in south New Guinea.

Its favorite food was wood-boring beetle larvae.

The long tongue was used in removing small grubs from small cavities in wood, and the contents of tough-skinned grubs. The rodent-like teeth were used in breaking open wood in search of grubs; the elongated fourth finger was used to draw out grubs from cavities. This corresponds exactly with the suppositions made by taxonomists regarding the habits of this group of animals.

A habit possibly associated with locating prey encased in wood is a light, quick tapping on a wood surface when examining it.

It is interesting to note the parallel development in structure (and habits?) of this creature and the Aye-aye (*Daubentonia*) of Madagascar.